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The efficacy of various methods of instruction to extrinsic feedback

Ethan Elliot Hamilton

THE EFFICACY OF VARIOUS METHODS OF INSTRUCTION TO EXTRINSIC FEEDBACK

A Project

Presented to the

Faculty of

California State University,

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In Partial Fulfillment

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in

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ABSTRACT

This project has been designed to measure the efficacy of various methods of instruction in relation to extrinsic (external) feedback. Practicing correct movements (positive feedback) is thought to encourage learners to repeat beneficial patterns. Conversely, emphasizing errors (negative feedback) is noted to dissuade learners from continuing poor habits. Free throw shooting in basketball was chosen as the skill to be acquired. This skill is a basic sport skill in which anyone can improve upon. Individuals were assigned to one of four groups, and they are as follows: a group which received only positive feedback, another group which received only negative feedback, a third group which received both positive and negative feedback, and a final group which received no feedback. The participants who utilized proper techniques in conjunction with error corrective techniques improved three times as much as individuals who received feedback only in attempting to correct errors. These participants also improved nearly two times as much as those only receiving feedback which firmly entrenched positive motions, and eight times as much as the control group who received no feedback in testing improvement from repetition alone. Therefore, it was concluded that individuals who received both types of positive and negative instruction gained the most information and were much more efficient.

TABLE OF CONTENTS

LIST OF TABLES

INTRODUCTION

Learning is possibly the most exciting yet intriguing part of education. A great deal of research has been devoted to determining the nature of the learning process. As a teacher, coach, and instructor, it is vital to understand how learning takes place. An instructor must realize that each learner may be at different stages of the learning process. Therefore, the instructional needs and approach to learning for each individual may be different.

Most educators would agree that effective provision of information about performance represents a vital key in the management of learning. The area of learning has been one of the most thoroughly investigated topics. Feedback must take place as the verbal response to a positive or negative action made by a participant. This feedback will be vital for the individual who is learning to gain improvement. Teachers who hope to be effective must become familiar with the concept of feedback and become skilled in providing information to learners about their progress.

Research on Feedback in Education

In an attempt to clarify the relative effectiveness of types of feedback in an education setting, McAllister, Stachowiak, Baer, and Conderman (1969) conducted a study employing a combination of reinforcement and punishment (i.e. a combination of positive and negative feedback) on two separate and distinct classes of behavior. They

defined and recorded the frequency of four specific behaviors in two classes: inappropriate talking, inappropriate turning around, verbal reprimands by the teacher, and praise by the teacher.

These actions were recorded as occurring or not occurring for each one-minute interval in a class period. After a twenty-seven day baseline period, the teacher began to administer verbal punishment for inappropriate talking (e.g. ``John, be quiet''), and when periods of quiet occurred she socially reinforced the whole class (e.g. ``Thank you for not talking and being quiet''). The amount of inappropriate talking steadily declined from approximately 24% to 5%. On the fifty-fourth day, the same contingencies were applied to inappropriately turning around in class. The frequency of this behavior likewise fell rapidly from 15% to 4%.

In a similar study, Lowe (1973) applied either the use of praise (positive feedback) or blame (negative feedback) to obtain information on increased efficiency in an athletic task. One hundred and twenty-five boys from an intermediate school were scored for five athletic events (broad jump, high jump, triple jump, shot-put, and fifty yard dash). It was concluded that praise improved the level of performance when compared with blame, and thus praise was the most consistent incentive for the improvement of performance.

In a study written in 1994, Wulf and Schmidt tested the success of frequent feedback. They measured the analysis of providing this feedback at random times versus blocked practices. The authors hoped to gain long-term retention through simple reminders. It was concluded that random practices with feedback reminders enhanced learning in most patterns of action. Although, more results did conclude that there was little or no effect on the ability to scale the pattern in measured time.

Another study, written in the Journal of Applied Biomechanics, evaluated the success of two different feedback schedules and measured the potential for feedback dependency. This study tested eighteen inexperienced cyclists. They either received concurrent feedback (CFB) or summary feedback (SFB). CFB would be feedback given throughout the course of the activity. Whereas, SFB was instructor given responses at the end of the entire activity. The study concluded that there were no statistically significant differences. However, it was shown that, in addition to repetition; feedback still played a major role in each individual's improvement (Broker, Gregor, and Schmidt, 1993).

Meanwhile, there was a medical study written in 1998 that assessed the effectiveness of instruction. The authors wanted to provide productive feedback to improve performance. This was done by having participants define

characteristics of effective feedback and practice using feedback in response with residents and attending physicians. Through research, this was found to be an effective approach (Bing-You, Bertsch, and Thompson, 1998).

Two years earlier, this feedback process was taken a step further in 1996. In an article written by Herold, Parsons, and Rensvold, it was argued that performance feedback's success varies among each individual. They used 498 working individuals who labeled which forms of extrinsic feedback were most successful to each of them. They found that people's reactions are not mutually exclusive to one factor. The authors concluded the article by planning to take the next phase in this research process by becoming even more specific than this study.

The studies described above serve to illustrate that when verbal reinforcement is used as feedback, it is an effective method in shaping certain behaviors. These studies will either examine verbal reinforcement or the roles different types of explicit corrective instruction might play in the skill learning process.

It is very difficult for an individual to learn a skill effectively without corrective feedback. With no indication of how a performance compares with a desirable standard, the learner lacks a point of reference. While it is true that with enough practice one can improve at skills such as throwing a bull's-eye in darts, bowling a strike,

or hitting the ball straight in golf, it remains that without proper instructive feedback poor habits will most likely develop. Conversely, repetition, combined with proper instruction, enhances performance and decreases the amount of time necessary for efficient skill acquisition.

In other words, without proper feedback individuals are essentially operating in the dark. In fact, this was demonstrated first by Thorndike (1931) in his classic experiment to determine the effect of feedback on subsequent performances. In this experiment, students made 3,000 attempts to draw a four-inch line while blindfolded. During practice, they were not told how closely their drawing approximated to the desired four inches. The 3,000 trials were organized into twelve sittings. Although performances varied, there was no general trend toward improvement. Meaning, the drawings in the later sittings were no better than those in the early sittings. In an attempt to replicate Thorndike's results, Kingsley (1957) conducted a similar experiment that also showed practice without feedback did not produce any improvements in performance.

In sports-related activities that require complex motor skills, the need for specificity of feedback appears to be very important. For example, there was an intriguing article written by sports writer Dick Young of the *New York Daily News* (October 30, 1980). He shared how George Brett,

the American League batting champion in 1980, and teammate Hal MacRae of the 1980 pennant winning Kansas City Royals, praised hitting coach Charlie Lau. They felt that because of the clarity and precision of Lau's feedback and instructions they had become successful hitters.

In the article, McRae states, ``Most hitting instructors tell you to watch the ball and be aggressive, the way the doctor will tell you to take two aspirin and go to bed. Shoot, I heard that story when I was a kid. Old men talking across a checkerboard table talk like that. Use your hands they tell you. They don't tell you when to use your hands.'' In the same article Brett stated, ``Charlie said he saw three things in my hitting that he could change and make me improve... he moved me off the plate, closed up my stance, and told me to concentrate on hitting the ball from second base to the left field line.'' Both players went on to state the thing that distinguished Lau from other coaches was the precision of his analysis.

These are examples that highlight the notion that technique is crucial in terms of acquiring consistent positive results in athletic skills. Athletes not properly instructed almost always develop poor habits that lead to inconsistent performance. Without instructional feedback of any sort, it is unlikely that proper learning will take place. A change in behavior can take place, but whether this change is in the desirable direction or not is most

likely accidental.

One can develop greater consistency in response but there is no assurance that the consistent response will be more accurate than the initial response. Such consistency may be in drawing a four-inch line, swinging a baseball bat, or shooting a basketball. The result may be a consistently poor response.

It has also been found that after a skill has been well developed, it may be retained without extrinsic (external) feedback. In fact, the skilled or experienced performer is usually more sensitive to the reception of intrinsic (internal) feedback than is the novice. Such an individual can more skillfully interpret subtle cues that give evidence of success. For example, in most sports, the experienced individual recognizes the importance of keeping their center of body low to the ground on defense, making them quicker and not allowing the opponent to move past him/her. At this point, the provision of extrinsic feedback on a regular basis may not be as necessary. However, it is vital to acknowledge that feedback has been a major support of increasing skill development.

The reason feedback contributes to skill learning is that ``feedback contains information that can adjust future conduct by past performance'' (Wiener, 1967). Wiener states, ``Feedback may be as simple as the common reflex or it may be a higher order feedback in which past experience

is used to regulate not only specific movements but also whole policies of behavior. With such a policy, feedback may, and often does, appear to be what we know under one aspect as a conditioned reflex of and under another as learning'' (Wiener, 1967, p.47).

In 1967, Sullivan, Baker, and Schutz conducted a study with 76 Air Force ROTC cadets. They measured the effects on learner performance with receiving immediate feedback versus receiving no feedback on various instructional materials. The authors concluded and suggested that a strategy with immediate feedback created more improvement than that with no feedback.

In 1992, there was a more sport specific study written in regards to swimming. This study examined the relationships between coaching behaviors and motivation in competitive age-group swimmers. Three hundred and twelve male and female athletes assessed their coaches' behaviors and their own ability and motivation using self-report measures. The results indicated that these young athletes self-perceptions and motivation are significantly related to the quantity and quality of coaching feedback they receive for performance success and errors (Black and Weiss, 1992).

Many more studies even look deeper into the feedback issue, focusing on a term called ``sensory feedback.'' This theory implies that efficient learning is dependent

upon the degree of self-regulatory control of sensory input place by learners on a given situation (Smith and Sussman, 1970). Learning and integration of motion, including performance factors, are determined by the direct sensory feedback effects of space displaced motion and sensory input (Smith and Smith, 1970). A cybernetic system of behavior is governed by a multifaceted set of conditions that offer more than reward or punishment; it offers feedback. In these terms, feedback means not only telling the person that he or she is wrong, but also how they are wrong (Smith, 1966).

In a similar study written in JOPERD (Journal of Physical Education, Recreation, and Dance), the authors developed a practice setting for tennis to maximize the amount of sensory and task-related information from the instructor. They desired to improve motor skill through various forms of intrinsic and extrinsic feedback. They found that through this new drill formation that instructors and coaches would be able to maximize their practices (Heath and Blackwell, 1995).

Lastly, a study conducted in an Illinois classroom shows the positive effects of praise by the instructor. Hitz and Driscoll (1989) share that there are particular effective ways to praise students. They term this as ``encouragement.'' It ``offers specific, teacher-initiated, and private feedback that focuses on improvement and

efforts, uses sincere and direct comments... avoids comparisons with others, helps children develop self-satisfaction and does not set-up the student for failure" (Hitz and Driscoll, 1989, p.3). It was concluded that this encouraging atmosphere created an environment in which students did not fear continuous evaluation.

Regardless of the specific field, every instructor needs to correct errors in learning and execution by either accentuating what has been performed correctly or rectifying what was done incorrectly. It is this aspect of reinforcement that this study wishes to examine, specifically, the effects of different types of extrinsic feedback. Which method of corrective instruction allows for the most efficient assimilation and the highest retention? If one style of correction were shown to be more efficient than another, then it would be beneficial for coaches and instructors to correct and reinforce accordingly. This study is to observe the different methods in corrective instruction using extrinsic feedback.

The author has often wondered when working with learners, does it confuse the individual by telling him or her what not to do? Is the process of muscle memory most enhanced by concentrating only on pointing what has been done correctly? Or does it make the most sense to combine these two philosophies and instruct by accentuating positive motions as well as using error corrective

techniques?

In this study, free throw shooting was selected for this purpose because it is a useable variable for isolating the different methods of corrective instruction, in that free throw shooting percentages can be augmented by refined form and repetition. Thus, if one method of instruction is more effective toward learning, this task should be more suitable to measure this.

The purpose of this study was designed to measure the efficiency of a variety of techniques in relation to extrinsic feedback. Emphasizing correct movements is thought to encourage learners to repeat these beneficial motions. Although the methods of corrective instruction are not by definition positive and negative reinforcement, the group that received instruction in the form of accuracy enhancement was labeled the ``Positive'' group. This group only received feedback that firmly entrenched positive movements.

The second group received feedback that did nothing other than to correct improper movements, was labeled the ``Negative'' group. A third group received feedback that firmly entrenched positive movements, as well as utilizing error corrective techniques. This group was labeled the ``Both'' group.

Finally, the fourth group acted as an untreated control, and thus received no feedback. Therefore, this

group served to test and change from repetition alone. The control group was labeled the ``None'' group.

Hypotheses

Hypothesis 1 - This hypothesis predicted that participants in the ``Positive'' group would demonstrate greater improvement than those in the ``Negative'' group. It was thought that accenting the positive would encourage subjects to repeat beneficial patterns. Conversely, if participants were only told what not to do, then this would not give the learner as much information as affirming positive movements.

Hypothesis 2 - It was predicted that participants in the ``Both'' group would exhibit greater improvement than either the ``Positive'' group or the ``Negative'' group. The ``Both'' condition was thought to provide the most information to the learner.

Hypothesis 3 - Finally, it was predicted that every treated group would show greater improvement than that of the control group. This would occur because each treated group had received feedback of some kind, whereas, the control group had not.

METHOD

Participants

The four methods of corrective instruction (``Positive,'' ``Negative,'' ``Both,'' and ``None'') were tested on forty-eight men and women. These individuals were selected from introductory Fitness for Life courses in basketball at Azusa Pacific University. Each participant was randomly assigned to one of the four methods of corrective instruction groups, with the exception that males and females were distributed equally across the four groups. As a result of this process, each corrective instruction group consisted of ten men and two women.

Stimuli and Procedure

Gymnasium facilities located at Azusa Pacific University were utilized. Each participant, receiving a signed copy, prior to the experiment completed a consent form. At the beginning of the experiment, each participant was allowed a fifteen-minute warm-up period, after which a baseline score of the number of made attempts out of ten free throws was established.

Following the establishment of their baseline score, each participant received a brief instructional statement lasting approximately 10 minutes. During this instructional period, proper free throw shooting technique was presented (see APPENDIX A).

Next, each participant received three sets of instructions that were approximately fifteen minutes in duration. These three sets of instructions were all followed by a test of made free throws out of ten attempts. The independent variable was the method of corrective instruction. That is, each member of the four correctional feedback groups was instructed and tested individually, and the participants in each of the four groups received a different type of instructional feedback.

Specifically, one group of participants was told only what they were doing correctly in terms of proper shooting technique. Another group was told solely what they were not doing correctly. A third group was instructed as to what they were doing correctly and also what they were doing incorrectly. Finally, there was the fourth group who acted as a control group, receiving no instruction testing improvement from repetition alone.

Example scripts for the instructional groups that received feedback are listed in APPENDIX B. In addition, during this feedback period, the participants in all four groups answered a brief self-regulatory questionnaire before shooting each set of ten free throws (see APPENDIX C for a copy of this questionnaire). The self-regulatory questionnaire contained several items, including the predicted score for the participants' next set of ten free throws, a satisfaction rating on the previous test, as well

as a perceived self-efficacy rating prior to each test. The entire process from start to finish for each participant required approximately eighty minutes.

RESULTS

The mean number of baskets and the standard deviation for each test for each treatment group are listed in Table 1. To test the hypotheses of this study, the critical values that are listed in Table 1 are those for the Baseline test (i.e. a Pre-treatment Test) and for Test 3 (i.e. the final Post-treatment Test). Here it should be noted that there were so statistically significant differences between groups for the baseline scores indicating that the four groups were comparable in free throw shooting prior to the treatment manipulations.

Table 1

Basket Means and Standard Deviations for Each Treatment Group for Each Test

Group	Baseline	1	2	3
Positive	5.3 ± 1.4	3.8 ± 1.5	6.3 ± 2.2	6.3 ± 1.2
Negative	6.1 ± 1.2	6.7 ± 1.2	6.3 ± 1.7	6.7 ± 2.6
Both	6.0 ± 1.9	6.5 ± 2.1	6.9 ± 1.4	7.8 ± 1.4
None	6.8 ± 2.0	7.2 ± 1.8	6.8 ± 1.9	6.6 ± 1.7

*The Overall Mean and Standard Deviation = 6.4 ± 1.9.

By inspection of Table 1, it can be seen that the third test all groups had improved with the exception of the group that received no instruction. Since the third test score was the critical score for testing the

effectiveness of the methods of corrective instruction, subtracting the baseline score from the third test score for each participant derived change scores. The means and standard deviations for these Baseline-Test 3 scores for each condition are listed in Table 2. These change scores represent the improvement made from the Baseline to Test 3 score.

Table 2

Means and Standard Deviations for the Baseline-Test 3 Change Scores

Group	**Number of Participants**	**Mean**	**Standard Deviation**
Positive	12	1.00	1.21
Negative	12	0.58	2.28
Both	12	1.75	1.29
None	12	-0.25	1.14
Overall	*48*	*0.77*	*1.67*

As can be seen by inspecting Table 2, the ``Both'' group (i.e. the group that received both positive and negative instruction) improved their mean free throw shooting scores by almost twice as much as the ``Positive'' group, about three times greater than the ``Negative'' group, and were eight times greater than the group receiving no instruction at the time of the third free throw test.

Next, using the values summarized in Table 2, a one-way Analysis of Variance (ANOVA) was computed and the results of the analysis are summarized in Table 3. This analysis revealed that for the Baseline-Test 3 difference scores, the instructional conditions used in this study had a significant overall affect on free throw shooting proficiency.

Table 3

Summary of the Analysis of Variance Used to Test the Differences Between the Mean Change Scores for the Four Treatment Groups

Source	df	SS	MS	F	P
Between subjects	47	130.48	-	-	-
C (COND)	3	25.06	8.35	3.49	0.02
Subject w Groups	44	105.42	2.40	-	-

To further examine the effectiveness of each method of instruction against the untreated control, post hoc analyses were conducted by computing separate *t*-tests. The results of these analyses are presented in Table 4. These post hoc analyses make it clear that both the ``Positive'' group and the ``Both'' group received types of instruction

that produced significant levels of improvement over the group that received no instructional feedback.

Table 4

Post Hoc Analyses; *t*-test Results

t(22)	Positive	Negative	Both
Positive	-	-	-
Negative	0.55, N.S.	-	-
Both	1.39, N.S.	1.54, N.S.	-
None	2.45, $p < 0.05$	1.12, N.S.	4.00, $p < 0.01$

In addition to these analyses, an analysis of variance was computed to test differences in the self-efficacy questionnaire scores between the four groups. This analysis revealed no significant results (APPENDIX C). Finally, although gender effects were not statistically analyzed because of the few number of women in each group, inspection of data suggests that there were no systematic gender differences.

DISCUSSION

The effects of positive and negative reinforcement on behavior have received a great deal of attention in educational research. However, there are limited amounts of research that have taken place in recent years, especially in the field of physical education, Kinesiology, and athletics.

It has been demonstrated, as well as noted, that positive reinforcement is a much more effective means of shaping behavior than negative reinforcement (e.g., McAllister, Stachowiak, Baer, and Conderman, 1969.). According to another study, Lowe (1973) extended the use of positive and negative reinforcement into the realm of athletic performance with the use of praise and blame. He demonstrated that praise improved the level of performance when compared with blame and was a more consistent incentive for improvement of athletic performance. In conclusion, similar results should be expected in skill learning when applying positive and negative methods of corrective instruction.

Because of these earlier findings the first hypothesis predicted that the ``Positive'' group would show greater improvement than the ``Negative'' group. Hypothesis 1 was only partially confirmed in that the individuals receiving feedback, which firmly entrenched positive movements, showed nearly twice as much improvement as those instructed

by means of error corrective techniques. However, the difference in improvement between theses groups was not statistically significant.

Hypothesis 2, which predicted that participants in the ``Both'' group would improve more than those in either the ``Positive'' group or the ``Negative'' group, was only partially confirmed. As is shown in Table 2 and Table 4, the ``Both'' group improved almost twice as much as the ``Positive'' group, and more than three times as much as the ``Negative'' group. However, while both of these differences approached significance, neither attained statistically significant results.

Hypothesis 3 was only partially confirmed as this hypothesis predicted that every treated group would exhibit greater improvement than that of the ``None'' control group that received no corrective feedback. While it is clearly demonstrated in Table 2 that all of the treated groups exceeded the improvement of the ``None'' control group, it is also true, as is shown in Table 4, that the difference in improvement between the ``Negative'' and ``None'' control group was not statistically significant.

These results are, for the most part, consistent with the findings of Thorndike (1931), who illustrated that without proper feedback individuals show no improvement in drawing a four-inch line. As hypothesized, there were no differences in athletic skill acquisition, the untreated

control was the only group that showed no improvement by the final test score (Tables 1 and 2). Thus, the clarity and precision of instructional feedback, as well the amount of feedback provided proved important. This was especially evidenced by the superior change in scores of the group receiving ``both'' types of instructional feedback (see Table 2).

Professional athletes like George Brett (*New York Daily News*) testify to the importance of precision and clarity when receiving instructional feedback. Information rich in detail appears to allow better knowledge of proper technique that ultimately leads to more consistent performance. This was certainly the case with free throw shooting. In a very brief time period (approximately one hour) participants who received comprehensive feedback displayed substantial improvement in their technique and form, as well as their results. Participants in the ``Both'' group went from a mean of 6.00 to a final test score of 7.75, an improvement of nearly two shots out of ten attempts! In summation, it is logical to conclude better improvement and results would occur with extended practice and increased instruction.

As hypothesized, participants receiving ``Negative'' instruction improved some; ``Positive'' instruction improved more than ``Negative,'' and the participants receiving ``Both'' types of instruction were able to learn

the most. It is evident that skill learning is enhanced by proper feedback, and the method of instructional feedback that is able to provide the most information to the learner proved to be the most effective teaching technique. It has been shown that providing feedback to the learner that teaches positive and negative instruction together provides more information to the learner than positive alone and negative alone, and this is most likely the cause for the highly significant improvement of the ``Both'' group.

Only teaching the learner what he or she did incorrectly appears to be the least effective teaching technique. This method in and of itself provides the least amount of information to the learner. Merely telling an individual what was wrong only eliminates one way of doing things. It does not provide the correct way, but only eliminates an error. ``Negative'' correction, therefore, in and of itself simply does not provide enough information.

``Positive'' correction alone explains what the correct movement is but does not give information to the learner as to what errors he or she is making. Only positive and negative instruction combined provides enough feedback whereupon the learner may make the necessary corrections. Negative instruction is, however, a critical ingredient for effective instruction. The issues that remain are which method should precede the other, positive

or negative, and to what ratio of positive to negative instruction should be administered. For instance, it may be more effective to give positive instruction first and negative instruction second, or perhaps it would be better to reverse this order providing negative first and then conclude each instructional point with a positive. Or could it perhaps be best to ``sandwich'' negative instruction between two positive remarks?

In conclusion, when teaching any skill that requires muscle memory, it is best to include both positive enhancement methods of instruction in conjunction with error corrective techniques. Informing the learner of correct form as well as errors allows the individual to improve quickly and efficiently. In about one hour, participants illustrated dramatic changes in both technique and results, and there is reason to believe that similar results would occur in any form of skill acquisition. Also as a suggestion for further studies, the author would recommend limiting the study to one gender or evenly splitting the participants into a male group and a female group.

APPENDIX A.

Free Throw Shooting Technique

In this section, criteria are given for proper free throw shooting technique. This detailed information was derived from the author's personal experience as a basketball coach and instructor of physical education. Examples of scripts used for each method of constructive instruction in the study are recorded in APPENDIX B.

Finger Position - in most cases, there is a natural space between the middle and index finger. The space between the middle and ring finger will be less. The fingers should not be spread to grip the ball because this will prevent proper rotation of the basketball.

Thumb Position - in most cases, the thumb and index finger form an angle of approximately 45 degrees.

Shooting Hand - the shooting hand should be relaxed on the ball so that the valve air hole can be seen between the middle and index fingers. Placing the hand on the ball in this manner will properly locate the hand side to side. The elbow should be located directly in line with the shoulder and hip, while the index finger should be in the center of the ball. When the shot is thrown, the index and middle fingers should push with the pads to obtain a definite backward rotation.

Off Hand - the off hand helps to balance the ball in a natural shot alignment position. Before the ball is shot,

the off hand should release from the ball as the middle and index fingers push down through the ball.

Palm on the Ball - when the shooting hand is placed on the ball in a natural flexed manner, there is an adequate space between the ball and the palm.

Elbow Position - before the shot, the elbow should be directly under the ball in a natural position perpendicular to the floor. As the shot is taken and the elbow rises above the shoulder, the back of the hand should be cocked at a 45-degree angle. The pads (tips) of the middle and index fingers face directly toward the mid-point of the rim (target). When the wrist starts forward the elbow moves laterally and, upon completion of the follow-through, is in direct line with the pads of the middle and index fingers and the target.

Arms - the ball should be held in a natural position. Arms should not be extended away from the body, for this position will cause tenseness. The elbows should not be brought back so that the ball is against the chest, for in order to shoot, the individual must move the ball forward and movement is not necessary. As the shot is taken, the elbow elevates upward to promote proper arch.

Shoulders and Hips - they should face the target area. A slight variation between each individual is to be expected. However, each individual's non-shooting shoulder should still face the target area.

Eyes - the ball should be centered to the right eye for right-handed shooter and to the left eye for left-handed shooters.

Knees - the shot should start with a flex of the knees and continue in one fluid motion. The shot starts in the leg muscles.

Foot Position - the shooting foot should be pointed toward the center point of the back of the rim. The feet should be set apart so that the player is balanced. If, by a push, a player can be easily moved sideways, then the feet are too close together. Conversely, feet too far apart will cause strain and tenseness. Therefore, the feet should be set about shoulder-width apart for proper balance and maximum appropriation of strength.

Follow-Through - the concept of the follow-through is when the middle and index finger pads have pushed through the ball. An individual must deliver the ball in a definite repetitive pattern to obtain consistent delivery. The follow-through must be completed, but not necessarily held. The shooter should simply follow the arch of the ball as it is released, and should feel that they are reaching up and out as far as possible and merely dropping the ball in the basket.

Range of Motion of the Follow-Through - when a player starts the forward movement of the hand, the finger pads are at 0 degrees. As the hand goes forward, the middle and

index finger pads push down through the ball completing about 100 degrees of movement. Players should strive to have their follow-through be as close to 100 degrees as possible each time they shoot. The wrist should move in a downward flexating motion only, and will turn out as the follow-through is being completed.

Wrist Movement - the wrist should move down and never turn sideways. The hand, on completion of the follow-through, will turn slightly outward. When the shot is delivered, the wrist energizes the release, moving before the forearm. By releasing the ball in this manner, the forearm will be forced up with the elbow inverted, with the middle and index fingers pointing downward.

Rotation - one of the most important concepts in delivering a basketball is to have consistent symmetrical backward spin. At this point, it is crucial to develop a definite repeated pattern. Left or ride side rotation is not desirable, nor is the so-called ▒knuckleball,▒ a shot which contains no spin.

Finish - the individual should finish the shot leaning forward with his/her weight on the balls of their feet. The head should never finish behind the vertical plane of the hips during a free throw or any other shot. The head should always be in front of the hips to prevent falling away or drifting. Fading causes the shot to be completely contingent upon upper body motions and therefore wastes all

preceding leg movement; consequently, these shots tend to be short of the goal. Fading will also cause the shot to be inconsistent, for one will never fade or drift the same way twice. Thus, the arms must then compensate for varying amounts of drift.

Positive Routine - players are told to have a definite routine. I agree, with a minor exception: a player should do, within the time allotted, the pre-ritual routine until they feel comfortable. In other words, one should not get caught up in the ritual of bouncing the ball twice and then shooting, if, after the second bounce, the individual is not ready or comfortable. The pre-ritual movements prior to a shot should be flexible to the point; namely, shooting when ready. The most important thing a player must do prior to delivering the ball is to place the shooting hand correctly on the ball. The pre-ritual routine might relax the player but the hand placement, ball location, and middle and index finger alignment determines the accuracy of the shot. Each shot has a different set of circumstances with varying degrees of pressure and distractions. Some of these are as follows:

- Early or late in the game
- Opponent harassment
- Fans in the background

Individual players will address the shot slightly different. Some of these various techniques are as follows:

- Taking deep breaths to relax
- Bouncing the ball once, twice, or three times
- Spinning the basketball

Five Basics (in order)

- Correct techniques
- Preparation
- Comfort at the free throw line
- Concentration
- Confidence

Good free throw shooters have the ability to blend the first four disciplines and by doing so their confidence level is above that of the average player.

APPENIDX B.

Examples of Scripts

Positive instructional scripts:

- ``That shot went in because you kept your eyes on the target.''
- ``Excellent follow-through.
- ``Good job of keeping your elbow in that time.''
- ``On that shot, your knees were bent and your weight shifted perfectly.''
- ``This time after you finish dribbling make sure you pause just a second before you shoot.''
- Very nice rotation on that shot. Continue to concentrate on leaning forward when you shoot.''

Negative instructional scripts:

- ``You didn't follow-through that time.
- ``Don't fade away, that's why the shot was short.''
- ``You keep taking your eyes off of the target. On this shot don't take your eyes off the rim.''
- ``Your knees weren't bent that time and your shoulders were not squared up to the target.''
- ``This time concentrate on not drifting.''
- ``Your elbow keeps going out. Don't let your elbow go out this time.''

Both positive and negative instructional scripts:

- ``Good balance on that shot, but don't watch the ball after you shoot it.''
- ``Your hand position is excellent, but you are not following through.''
- ``You are bending your knees too much, but the rotation of the ball is perfect.''
- ``Excellent follow-through, but make sure you concentrate on leaning forward and not falling away.''
- ``Good balance and wrist movement, but try this time to keep your shoulders and hips squared up to the basket.''
- ``Great job on keeping your elbow in, but don't spread your feet so far apart, it throws off your balance.''

APPENDIX C.

Self-Regulatory Questionnaire

Prior to Baseline

1. For your first set of ten free throws, place a check next to the number that best signifies your confidence level (1 being completely unconfident and 10 being totally confident):

1_____ 2_____ 3_____ 4_____ 5_____ 6_____ 7_____ 8_____ 9_____ 10_____

2. You are going to shoot a set of ten free throws. How many shots out of ten attempts do you think that you will make?

_____

Prior to 2nd set

1. For your next set of ten free throws, place a check next to the number that best signifies your confidence level (1 being completely unconfident and 10 being totally confident):

1_____ 2_____ 3_____ 4_____ 5_____ 6_____ 7_____ 8_____ 9_____ 10_____

2. On a scale of 0-100 (0 being very unsatisfied and 100 being ecstatic), how satisfied are you concerning your last set of free throws? _____

3. You are going to shoot another set of ten free throws. How many shots out of ten attempts do you think that you will make?

_____

Prior to 3rd set

1. For your next set of ten free throws, place a check next to the number that best signifies your confidence level (1 being completely unconfident and 10 being totally confident):

1_____ 2_____ 3_____ 4_____ 5_____ 6_____ 7_____ 8_____ 9_____ 10_____

2. On a scale of 0-100 (0 being very unsatisfied and 100 being ecstatic), how satisfied are you concerning your last set of free throws?

_____

3. You are going to shoot another set of ten free throws. How many shots out of ten attempts do you think that you will make?

_____

Prior to final set

1. For your last set of ten free throws, place a check next to the number that best signifies your confidence

level (1 being completely unconfident and 10 being totally confident):

1_____ 2_____ 3_____ 4_____ 5_____ 6_____ 7_____ 8_____ 9_____ 10_____

2. On a scale of 0-100 (0 being very unsatisfied and 100 being ecstatic), how satisfied are you concerning your last set of free throws?

_____

3. You are going to shoot the last set of ten free throws. How many shots out of ten attempts do you think that you will make?

_____

4. How many hours did you practice during the last week?

_____hours

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